Correlation Between Charge Radii and p + Zr Reaction Cross sections for Zr isotopes with A = 90 -100

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Mean squared charge radii for a range of Zr isotopes have recently become available. When these values are plotted as a function of the mass number, they show an abrupt jump with a change of slope around mass A = 98. Relativistic mean field calculations have been performed to understand this feature. To further investigate this anomalous behaviour of mean squared charge radii, the proton elastic scattering data at 50 MeV available for the zirconium isotopes A = 90 -96 have been analysed by microscopic and phenomenological optical potentials. Predictions have been made for the elastic scattering cross sections for the isotopes with A = 98 and 100. The reaction cross sections obtained from the optical model analysis are plotted against mass number. There is a correlation between the charge radii and the corresponding reaction cross sections as a function of mass number of Zr isotopes in the region A = 90 -100.It is proposed to measure the proton elastic cross sections for these unstable Z isotopes to confirm this prediction.

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